

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

BC
FCC 82-225
31304

In the Matter of)
)
Changes in the Rules Relating) Docket No. 20735
To Noncommercial, Educational)
FM Broadcast Stations.) RM-1974, RM-2655

SECOND FURTHER NOTICE OF PROPOSED RULE MAKING
Adopted: May 13, 1982 Released: May 26, 1982

By the Commission: Commissioner Dawson concurring in part and dissenting in part.

INTRODUCTION

1. In this Second Further Notice of Proposed Rule Making the Commission addresses the remaining issues requiring resolution in this comprehensive proceeding. They are: (1) the need to adopt additional assignment standards for educational FM broadcast stations to provide protection to the reception of Channel 6 television signals; and (2) the need for an assignment table for noncommercial, educational FM stations.

2. Briefly, the Commission proposes to adopt standards which would limit interference to TV Channel 6 reception as a result of noncommercial, educational FM station operation on the basis of recently obtained technical information. However, while we do not propose rules which would create an assignment table for noncommercial, educational FM stations, for reasons which will be discussed, we retain an open mind and request comments on this issue.

TV Channel 6 Interference Protection Standards

3. The Commission has, over the past few months, expended considerable staff time in reviewing the technical filings in response to the Notice and the Further Notice.^{1/} In addition, we have conducted tests at our Laurel Laboratory to confirm engineering "hunches" in areas where insufficient information was contained in the docket file. During the period the interference question has been open to public comment and under study by the Commission, the process of granting authorizations to construct educational FM facilities has been clouded by uncertainty over the outcome of this proceeding. The Commission's action in granting requests for new or modified educational FM stations has been challenged for its failure to recognize the impact these stations have on the service areas of TV Channel 6 stations (McGraw-Hill Broadcasting Company v. FCC, Case 78-1895, U.S. Court of Appeals for the

^{1/} See the Notice of Proposed Rule Making, Docket 20735, published in the Federal Register (41 F.R. 16973) on April 23, 1976 and the Further Notice of Proposed Rule Making, Docket 20735, published in the Federal Register (43 F.R. 27682) on June 26, 1978.

District of Columbia Circuit). We hope that consideration of this document will help to dispel much of the accumulated uncertainty.

4. The spectrum between 88 and 108 MHz is allocated for FM broadcasting and of this, the lower 4 MHz (88-92 MHz) is reserved for noncommercial, educational FM broadcasting. This spectrum is immediately adjacent to TV Channel 6 (82-88 MHz) so the potential exists for inter-service interference. As a practical matter, the comparatively narrow bandwidth (.2 MHz) used in FM broadcasting, coupled with the high selectivity of FM receivers, effectively precludes TV-to-FM interference. The reverse is not true, however, since the wide bandwidth (6 MHz) used in TV broadcasting, coupled with our policy of not assigning adjacent TV channels in the same area, has resulted in the development of TV receivers with inadequate adjacent channel selectivity. ^{2/} Accordingly, as noncommercial, educational FM broadcasting has developed in the lower portion of the FM band, interference caused to the reception of TV Channel 6 has increased. While this interference problem exists for most of the educational FM band, it is aggravated as the frequency of the FM station approaches 88.1 MHz (i.e., as the FM frequency moves closer to Channel 6). Since existing Commission rules do not recognize the problem, there is presently no restriction on the location or facilities of a noncommercial, educational FM station with a view toward protecting the reception of TV Channel 6.

5. The amount of interference resulting from the operation of a noncommercial, educational FM station is fundamentally dependent upon the selectivity of the TV receiver and the signal strength ratio (at the TV receiver) between the TV and FM signals. ^{3/} The selectivity of the TV receiver varies as a function of frequency. In the case of noncommercial, educational FM stations, selectivity is least (and susceptibility to interference greatest) at the lower edge of the noncommercial educational FM band. It has been argued by noncommercial, educational FM interests that the educational FM to TV Channel 6 interference problem is entirely due to poor selectivity in TV receivers and that manufacturers should be required to produce a higher quality product. However, receiver manufacturers and TV Channel 6 station interests argue that the interference problem is equally (if not primarily) due to FCC allocations policies, and that it would be impossible to produce a TV receiver with appropriate wide bandwidth (6 MHz) and

^{2/} We are referring to channels which are adjacent in terms of frequency, not channel number. Channels 3 (60-66 MHz) and 4 (66-72 MHz) are adjacent to each other in both frequency and channel number, while Channels 6 (82-88 MHz) and 7 (174-180 MHz) are adjacent in channel number only.

^{3/} The signal strengths of the TV and FM stations are functions of effective radiated power (ERP), antenna height and distance, and may be predicted using appropriate curves in FCC-OCE Report No. R-6602 (Development of VHF and UHF Propagation Curves for TV and FM Broadcasting), September 7, 1966. (See also §§73.333 and 73.699 of the Commission's Rules.) Conversely, once the signal strength of either the TV or the FM station and the TV receiver selectivity is known (which may include consideration of the use of an external FM band-reject filter), it is possible to calculate the effective interference resulting from the operation of the FM station.

sufficient selectivity to adequately attenuate the signal of a noncommercial educational station which may be located as little as 0.1 MHz removed.

6. While the Commission in the past has not adopted rules for FM in consideration of television receiver performance, we feel that in this particular case the reason for the interference problem lies somewhere between the two positions mentioned above. Accordingly, we have developed some TV Channel 6 interference protection standards which we feel should constitute an adequate solution to this problem. These standards should not be viewed as static. They were developed with the aid of a sophisticated computer program that has capabilities which we are not immediately using but which we propose to use. The computer program also lacks other capabilities which are desirable. The standards being proposed should be viewed as being in the first stage of development with subsequent stages clearly charted, but dependent on Commission staff resources for attainment. In this sense, we believe they are unique in that they have been developed to meet an immediate need; yet, they are based on dynamic characteristics permitting their later refinement. This area is discussed in more detail, infra.

7. Because of our desire to later modify the assignment standards if adopted, they may rightly be viewed as interim standards until the refinement process is complete. Normally the Commission would not propose to adopt standards when it recognizes the necessity of later modifying them. In this instance we are persuaded that the need for the standards, in terms of permitting the orderly processing of educational FM applications on a clearly recognized basis, outweighs any inconvenience of having to revisit them in the future. Finally, we must point out that any proposed refinements would not impose additional restrictions on educational FM stations, but would simply improve our ability to judge the interference potential of each application and in many cases to authorize facilities in excess of those proposed in this document. We proceed with our discussion of the development of the proposed protection standards.

8. For the purposes of this discussion, we are treating noncommercial, educational FM stations as being in either of two situations:

1. Non-co-located with the TV Channel 6 station; and,
2. Co-located with the TV Channel 6 station. 4/

Historically, the first situation has resulted in the greatest number of TV Channel 6 interference problems and we address it initially.

9. We began our analysis of this situation by approximating the capability of an average television receiver to reject unwanted educational FM signals when tuned to Channel 6. To do this an undesired-to-desired (U/D) signal strength ("rejection") ratio was established for each educational FM

4/ When using the term "co-located" in this document, we mean that the non-commercial, educational FM station's antenna is within one mile of the TV Channel 6 station's antenna. Thus, unless otherwise indicated when used herein, co-located will refer to "proximate" rather than "exact" co-location.

frequency using FCC/OST Lab Report No. 79-01. ^{5/} The FCC report from which the rejection ratios were taken describes the results of studies involving 45 television receivers. The receivers may be categorized as 20 "older" receivers, 20 "newer" receivers and 5 "special" receivers. The 20 "older" receivers were manufactured during the period from 1968 to 1976. The "newer" receivers were manufactured in 1977 and 1978. The "special" receivers incorporated unusual or sophisticated circuitry or components, or were otherwise atypical.

10. We concluded (as did most of those who filed comments earlier in this proceeding) that it would be more appropriate to use the median rejection ratios from the 20 "newer" receivers to establish receiver performance since they are more representative of receivers in general use than those in the "older" group. We found, however, that there were deviations in the performance of the "newer" television receivers in a few instances. For example, as the educational FM station's frequency increased, the rejection capability of the television receiver, which should increase, might do so for some FM frequencies but not for others, due to predictable alignment irregularities. When the rejection ratios for the 20 "older" receivers were added into the median calculations, there were no irregular values. This led us to believe that the irregularities noted were due to the small sample size being tested and were not a general indication of receiver performance. To correct for this, rejection values that decreased from the preceding ratio (of the next lower frequency) were replaced with the ratio from the lower frequency. Intermediate channel U/D ratios were obtained using linear interpolation between adjacent channel ratios. This results in the following table:

TABLE A

FM CHANNEL	FREQUENCY	U/D RATIOS FOR TV SIGNAL STRENGTHS OF		
		-65 dBm	-45 dBm	-15 dBm
201	88.1 MHz	1.0 dB	-4.5 dB	-7.5 dB
202	88.3	3.8	-2.8	-6.8
203	88.5	6.5	-1.0	-6.0
204	88.7	9.3	1.3	-5.5
205	88.9	12.0	3.5	-5.0
206	89.1	16.5	3.5	-5.0
207	89.3	21.0	3.5	-5.0
208	89.5	21.0	3.5	-4.5
209	89.7	21.0	3.5	-4.0
210	89.9	21.0	3.5	-4.0
211	90.1	21.0	3.5	-4.0
212	90.3	21.8	4.3	-3.3
213	90.5	22.5	5.0	-2.5
214	90.7	24.8	5.5	-1.5
215	90.9	27.0	6.0	-0.5
216	91.1	28.0	7.5	---

^{5/} See FCC/OST Lab Report No. 79-01 (Tests of TV Receivers for "Just Perceptible" Interference to TV Channel 6 from Educational FM Signals), September, 1979.

217	91.3	29.0	9.0	---
218	91.5	32.5	12.5	---
219	91.7	36.0	16.0	---
220	91.9	39.0	18.5	---

The headings for the three columns of ratios (-65 dBm, -45 dBm and -15 dBm) indicate the TV Channel 6 signal strengths used for that series of tests. The -65 dBm signal strength was chosen to simulate reception at the Grade B contour. With no interference, it resulted in a "passable" picture with some apparent receiver noise (or "snow"). ^{6/} The introduction of "just perceptible" interference from an FM station did not and would not affect a "passable" picture significantly, because "just perceptible" interference would probably not be noticed by an average viewer. Likewise, "fine" or "excellent" pictures would not be altered to "passable" by the introduction of "just perceptible" interference. Therefore, we believe we should allow FM stations to cause more than "just perceptible" interference. Thus, we propose to use the -65 dBm ratios universally (*i.e.*, for signal strengths greater than -65 dBm) in our interference model. However, it should be recognized that this choice may result in "excellent" or "fine" pictures being degraded to "passable" or even "marginal" because as can be seen from the above tables, use of the -65 dBm ratios may result in interference signal levels which are 20 dB (100 times) above "just perceptible" levels for desired levels of -45 dBm and -15 dBm. Comment is sought on this proposed use of the -65 dBm TV receiver selectivity data.

11. We turn our attention next to the usefulness of external FM filters that could be attached to the receiver to theoretically increase its overall rejection capability. We found that information in the Docket file on the efficacy of external FM band-reject filters was sparse and contradictory. For the most part it consists of statements that filters did (or did not) help in specific cases. However, we believe that by reducing the FM signal, filters can improve the situation in many interference cases, particularly those where the interference is not severe. Because the Docket file lacks convincing data on how much attenuation a filter can provide without degrading the TV signal itself, the FCC Laboratory staff has performed a brief

^{6/} Definitions for picture quality are found in Engineering Aspects of Television Allocations, Report of the Television Allocations Study Organization (TASO) to the Federal Communications Commission, March 16, 1959. A "passable" picture is of acceptable quality with no objectionable interference. A "marginal" picture is poor in quality and interference is somewhat objectionable.

series of tests on different filters. ^{7/} It was concluded that filters could reasonably be expected to provide 20 dB attenuation for FM frequencies above 88.7 MHz (Channel 204), and 8 dB attenuation of a signal at 88.1 MHz (Channel 201). We assume that people experiencing interference will obtain a filter ^{8/}, so we believe we should use the above values, as well as 11 dB, 14 dB and 17 dB for FM Channels 202, 203 and 204, respectively. Comment is sought on the use of FM-reject filter performance in the model generally, and on the use of this new data in particular.

12. When the -65 dBm ratios and the filter values are combined, the following relative powers would be permitted (referenced to a value determined at 90.1 MHz, Channel 211):

TABLE B

FM CHANNEL	FREQUENCY	POWER ADJUSTMENT
201	88.1 MHz	-32.0 dB
202	88.3	-26.2
203	88.5	-20.5
204	88.7	-14.7
205	88.9	-9.0
206	89.1	-4.5
207	89.3	0
208	89.5	0
209	89.7	0
210	89.9	0
211	90.1	0
212	90.3	+0.8
213	90.5	+1.5
214	90.7	+3.8
215	90.9	+6.0
216	91.1	+7.0
217	91.3	+8.0
218	91.5	+11.5
219	91.7	+15.0
220	91.9	+18.0

^{7/} This information is contained in an FCC/OST Report entitled "Options for Relief of Interference to TV Channel 6 from Educational FM Stations" by Hector Davis. As soon as internal approval is given, a preliminary copy of this Report will be placed in the Docket file. In the event this information cannot be made available in a timely manner, the Commission will consider requests for extension of the comment period, or may extend the comment period on its own motion.

^{8/} This assumption reflects our rejection of the opinion set forth by certain TV Channel 6 interests that the general public should bear no burden in the resolution of Channel 6 interference problems. We believe owners of receivers with poor selectivity must bear part of the burden for the interference susceptibility of the set.

For the reference channel (90.1 MHz, Channel 211) the U/D ratio to be used for determining predicted interference is 41 dB.

13. In order to evaluate the relative effects of noncommercial, educational FM stations located at different distances from a Channel 6 TV station, a special computer program was developed by the Commission's staff. ^{9/} The program introduces a new method of determining interference called "effective interference." In general, the probability of receiving service (or stated another way, the percentage of locations receiving service) varies with the distance from the TV station. At the Grade B contour there is a 50% probability of receiving service. At the Grade A contour there is a 70% probability. Likewise, the probability of a receiver tuned to Channel 6 receiving interference from an educational FM station varies with the distance from the FM station. Effective interference is the combination or joint probability of receiving service and interference summed up for all locations within the service area of the TV station. When multiplied by population density, the effective interference value gives the total number of people receiving interference. Effective interference presents a more accurate and flexible criterion for evaluating interference than the standard method. The standard method involves calculating the area inside a contour around an FM station where 50% or more of the locations receive interference regardless of whether or not they receive service.

14. The program allows choice of the minimum probability of acceptable reception to be defined as service. Traditionally, allocation standards for television stations have considered service to a distance where the probability of acceptable reception is 50%. This has been defined as the Grade B contour. While reception can exist beyond the Grade B contour, protecting it from interference would result in a much smaller number of possible stations. Accordingly, for determining the effective interference of a noncommercial, educational FM station, we believe we should consider only service inside the TV Channel 6 station's Grade B contour.

15. To facilitate the computer studies it was necessary to hold several parameters constant. For example, the FM station frequency was fixed at 90.1 MHz (the adjustment to be used for other frequencies has been given in Table B). The FM station antenna height was fixed at 100 feet HAAT. For higher antenna heights, the power of the FM station must be reduced so that the station's predicted F(50,50) field strength (usually determined at 1.0 mile) does not exceed that expected at 100 feet HAAT.

16. Additionally, the Channel 6 power and antenna height were fixed at 100 kW (20 dBk) and 1,000 feet HAAT. The permitted FM power will depend on the Channel 6 field strength at the FM station, so the choice of the Channel 6 facilities has only a very minor effect on the results. For a specific FM

^{9/} This information is contained in a Report entitled "A Computer Program for TV Interference," FCC/OST Computer Program TVINT, by Harry K. Wong. As soon as internal approval is given, a copy of this Report will be placed in the Docket file. In the event this information cannot be made available in a timely manner, the Commission will consider requests for extension of the comment period, or may extend the comment period on its own motion.

frequency and antenna height, the field strength allowed at the TV Channel 6 station's Grade A contour is the same, regardless of any variation in the TV facilities. Finally, no consideration was given to terrain roughness or to the use of a different antenna polarization by the educational FM station from that employed by Channel 6 stations. 10/

17. The record in this proceeding indicates that the most serious instances of interference result when a noncommercial, educational FM station is located between the TV Channel 6 station's Grade A and Grade B contours. For purposes of making the initial computer studies, the distance between stations was fixed at 34.3 miles in order to simulate locating the FM station at the Grade A contour of a 100 kW, 1000 feet HAAT Channel 6 station. The following table indicates the result:

TABLE C

FM STATION POWER (Watts ERP)	FM STATION PROTECTED SERVICE AREA		AREA WITHIN WHICH PROBABILITY OF INTERFERENCE EXCEEDS 1% <u>11/</u>		EFFECTIVE INTERFERENCE (Sq. Mi.)
	(Sq. Mi.)	(Radius)	(Sq. Mi.)		
100	39	3.5	3.8		0.04
500	88	5.3	8.4		0.16
1,000	129	6.4	11.9		0.29
5,000	278	9.4	27.2		0.94
10,000	401	11.3	39.8		1.47
50,000	866	16.6	99.6		3.80
100,000	1182	19.4	155.9		5.60

18. While every attempt has been made to make the effective interference determination accurately reflect the average effect of a noncommercial, educational FM station, it is quite possible in individual cases that the actual interference will be different than that predicted. Nevertheless, the table given above represents our best estimate of the average area that will lose Channel 6 service, despite the anticipated use of filters.

10/ It was hoped that vertical polarization of noncommercial, educational FM signals would provide a measurable amount of additional protection to TV Channel 6 signals. However, all of the data available at this time indicates that while vertical polarization may prove helpful in reflection-free radio environments, it is of very uncertain value otherwise, particularly in urban environments. Accordingly, consideration of this potential effect has not been included in the model but we do plan to consider it further as noted in Paragraph 35.

11/ The probability of interference is assumed negligible where it is less than 1%. This is necessary because constraints on computer processing time limit the accuracy of the program when small effective interference areas are being considered.

19. It is necessary to strike a balance between the conflicting goals of limiting TV Channel 6 interference and providing for a viable educational FM service. Clearly, limiting the predicted effective interference to 0.04 square miles would prevent most interference, but at the Grade A contour, Channels 201-204 would be unusable and Channels 205 and 206 would be usable only by 10 watt, Class D stations serving very small areas. On the other hand, allowing the predicted effective interference to be as large as 5 or 6 square miles would introduce minimal additional burdens on the educational FM service, but would cause a large potential expense in terms of viewers losing TV Channel 6 service.

20. With due consideration to the interference side of the equation, we consider it important to allow some primary educational FM use of most of the educational FM spectrum. Any restriction of maximum power to less than 100 watts (the minimum Class A station power) would result in only secondary (10 watt, Class D) stations being allowed. Therefore, we have decided to impose a limit of 0.30 square miles of predicted effective interference on new noncommercial, educational FM stations. The result of this limit at the Grade A contour is to require stations using the four lowest educational FM channels (201-204) to operate with less than 100 watts ERP. It should be evident that the selection of the effective interference value has a direct effect on the facilities which would be permitted at noncommercial, educational FM stations. To the extent possible, interested parties should study the Commission's computer model referenced in Footnote 9, in addition to the values given in Table C, to understand this relationship. Parties should file substantive comments with supporting documentation on what degree of effective interference should be deemed permissible.

21. Based on additional computer studies with the assumed noncommercial, educational FM station not located at the Grade A contour, but with the effective interference fixed at .30 square miles, the most severe limit on FM power is for a station located just inside a TV Channel 6 station's Grade B contour. At that location, a Channel 211 station would be limited to a maximum ERP of -18 dBk at an antenna HAAT of 100 feet. The effect of this restriction is to make the lower 6 channels (201-206) unusable and the middle 11 channels (207-217) limited to an ERP of less than 100 watts. Accordingly, we propose to reverse our decision in the Second Report and Order in this proceeding to the extent that we would allow continued and new operation of 10 watt, Class D stations at locations where the FM frequency and the TV Channel 6 field strength result in a maximum permitted power of less than 100 watts. These Class D operations would not be protected from interference from higher powered facilities in less restricted locations, but they would receive protection from each other. We specifically seek comments on this proposal.

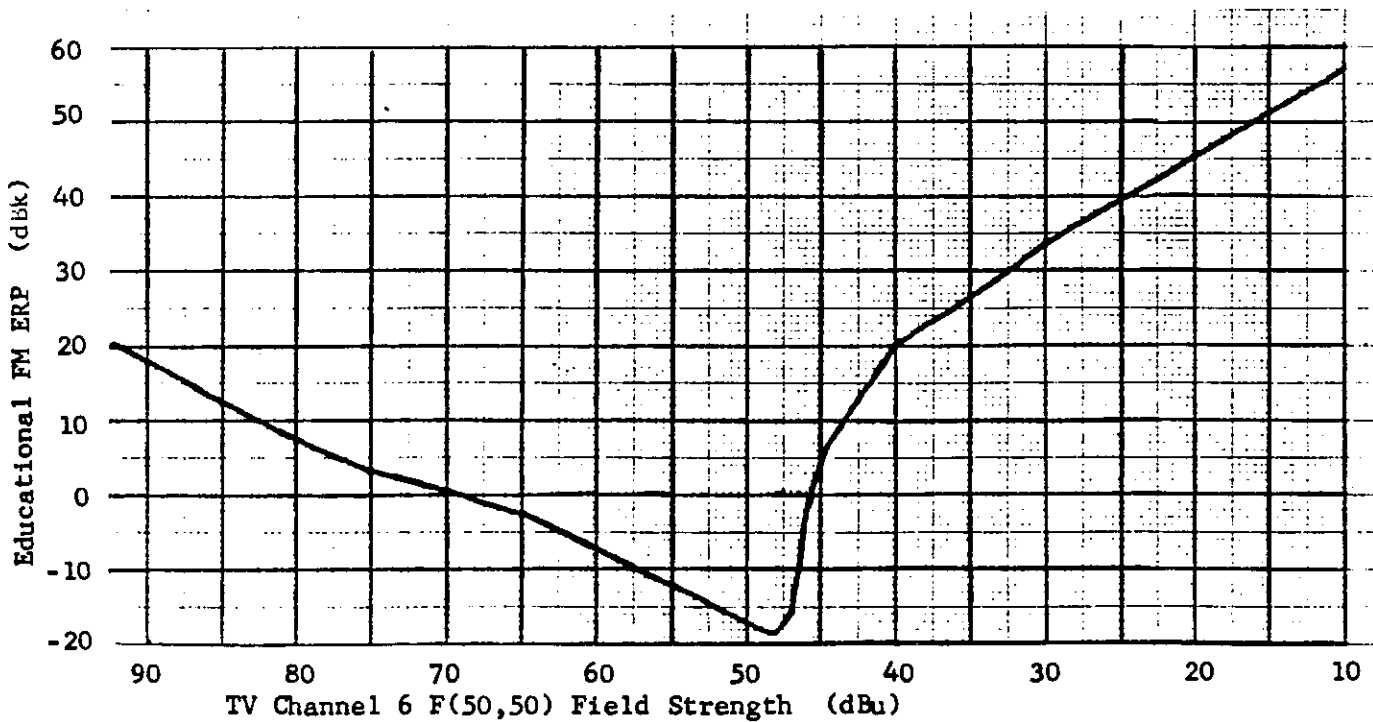
22. The results of computer studies done with the permitted effective interference fixed at .30 square miles are summarized in the following table and illustrated by the following graph:

TABLE D

TV CHANNEL 6 STATION
F(50,50) FIELD STRENGTH
(dBu)

PERMITTED FM STATION ERP @ 100 FEET HAAT
FOR OPERATION ON CHANNEL 211
(dBk)

90.0	18.0
85.0	12.7
80.0	7.7
75.0	3.3
70.0	0.8
65.0	-2.2
60.0	-7.0
55.0	-11.8
50.0	-16.9
49.0	-17.8
48.0	-18.6
47.8	-18.6
47.6	-18.6
47.4	-18.4
47.2	-17.4
47.0	-15.3
46.0	-1.7
45.0	5.0
40.0	20.0
30.0	33.4
20.0	45.1
10.0	56.9



The data should be used as follows:

- 1.) The noncommercial, educational FM station applicant should determine the distance to the nearest authorized, full service Channel 6 TV broadcast station. We are not proposing protection for vacant TV allotments, low power TV stations or TV translator stations.
- 2.) Using the TV Channel 6 station's authorized ERP and HAAT, and the F(50,50) propagation curves in the Commission's Rules (see §73.699, Figure 9), the predicted field strength at the proposed FM station transmitting site should be determined.
- 3.) If the predicted TV Channel 6 signal strength appears in the left column of Table D, the permitted power (for a station on 90.1 MHz, Channel 211, with an antenna HAAT of 100 feet or less) is read from the right column. If the predicted field strength falls between two values in the left column, the applicant should interpolate linearly between the corresponding values in the right column.
- 4.) If the intended HAAT of the FM station is greater than 100 feet, a reduction in the permitted power found in step 3 is necessary.
 - (a) Using the permitted power found in step 3, a 100 foot HAAT and the FM F(50,50) curves (see §73.333, Figure 1), the predicted field strength at one mile should be determined. If the FM station is to be located more than 1.0 mile outside the TV Channel 6 Grade B contour (F(50,50) Channel 6 field strength equals 47 dBu at the Grade B contour), the predicted field strength at the distance from the FM station to the Grade B contour should be determined.
 - (b) Using the intended antenna HAAT, the appropriate distance from step (a) and the FM F(50,50) curves, the permitted power should be reduced to that which produces the predicted field strength determined in step (a).
- 5.) If the FM station's frequency is not 90.1 MHz, the permitted power should be further adjusted by the value indicated in Table B.

23. For example, suppose an applicant determines that, considering only FM stations, a 1 kW ERP, 200 feet HAAT station at 90.9 MHz (Channel 215) would fit at a site 40.0 miles from a 100 kW (20 dBk), 1000 feet HAAT Channel 6 TV station. From the F(50,50) curves, the predicted TV Channel 6 field strength at the FM site is 63.6 dBu. From Table D, the permitted power is between -2.2 dBk and -7.0 dBk. Interpolating linearly, the permitted power is $((3.6/5.0) \times 4.8) - 7.0 = -3.5$ dBk. From the FM F(50,50) curves a -3.5 dBk, 100 feet HAAT station would have a predicted field strength at 1.0 mile of 88.5 dBu. For a 200 foot HAAT FM station to have a predicted F(50,50) field strength of 88.5 dBu at 1.0 mile, the power must be reduced to -9.5 dBk. Finally, from Table B, a +6.0 dB power adjustment due to frequency is

necessary, so the permitted power for the noncommercial, educational FM station would be -3.5 dBk (450 watts).

24. In some cases, the educational FM station's predicted interference area will occur where Channel 6 service is not expected due to interference from either a Channel 5 or a different Channel 6 station. If there is no service to be lost, we clearly can relax the restrictions. While the existence of a TV interference source is not a factor in the computer model, we propose the following additional procedure to consider it.

25. Co-channel TV interference has traditionally been considered to occur when the undesired station's F(50,10) field strength is less than 28 dB below the desired station's F(50,50) field strength. Interference from a lower adjacent channel station (Channel 5 in this case) is considered to occur when the undesired station's F(50,50) field strength is more than 6 dB above the desired station's F(50,50) field strength. ^{12/} As with educational FM interference, these situations only result in a probability of interference, so there will be locations that will continue to receive service despite the prediction of interference.

26. Since there will be locations still getting service in the TV interference area, we propose a conservative additional adjustment to the previously computed allowable educational FM station's power. If, at the proposed educational FM station's site, an interfering Channel 5 or Channel 6 station's field strength exceeds the above interference criteria by X dB, we propose to allow the educational FM station an X dB increase in power. Extending the example in paragraph 23, if an applicant's site is 25 miles from a TV station operating on Channel 5 with 100 kW ERP and an antenna height 1,000 feet AAT, the Channel 5 F(50,50) field strength would be 75 dBu. Since that value is 11.4 dB higher than the 63.6 dBu predicted Channel 6 field strength, interference from Channel 5 is predicted to occur. The educational FM station's permitted power may be increased by 5.4 dB (11.4 dB - 6 dB) so instead of -3.5 dBk, this applicant would be permitted 1.9 dBk (1,500 watts).

27. This is a conservative adjustment because interference from the educational FM station occurs in the immediate vicinity of the station's transmitting antenna where its field strength is decreasing rapidly with distance (3 to 10 dB per mile). On the other hand, the interfering signal from the TV station will, in most cases, be changing at a rate of 1 dB per mile or less. If the TV D/U ratio required to provide Channel 6 service at the educational FM station's location is 5 dB less than required, in other words the ratio is -11 dB instead of -6 dB, the -6 dB D/U contour within which service would be rendered is at least 5 miles away. Over that 5 mile distance the educational FM station's field strength will probably decrease by 15 to 20 dB. Therefore, the 5 dB increase in educational FM station power would not cause its interference to extend into the predicted Channel 6 service area.

^{12/} See, A Review of the Technical Planning Factors for VHF Television Service, Gary S. Kalagian, FCC/OST/RS 77-01 (1977), National Technical Information Service No. 266341.

28. Table D includes values down to a predicted TV field strength of 10 dBu which is far beyond a station's Grade B contour. A number of factors which were not considered in the computer studies decrease the likelihood that an FM station, even on Channel 201, would cause noticeable interference inside a TV Channel 6 station's Grade B contour for a station-to-station distance of more than 140 miles. Front-to-back rejection of receiving antennas should reduce the chance of interference. Other sources of additional programming may be available to Channel 6 viewers near the Grade B contour so that the few locations that are predicted to get interference may not contain anyone attempting to watch Channel 6. We believe it is unlikely that an FM station located 100 miles from a Channel 6 service area would be the principal cause of anyone's interference. For these reasons, we do not propose to place any restriction on a noncommercial, educational FM station located more than 140 miles from a Channel 6 TV station (these locations would be 60 to 100 miles beyond the Grade B contour).

29. Also, Table D only includes values up to a predicted TV Channel 6 signal strength of 90 dBu. For most Channel 6 stations, this predicted field strength would occur 8 to 15 miles from the TV tower. In areas closer to the TV tower, two phenomena occur. The vertical radiation pattern of the transmitting antenna begins to have an effect. With the main lobe directed at the radio horizon, the ERP toward receiving locations close to the tower can be significantly less than that which would normally be expected. The result can be that the median field strength will remain relatively constant over this area, whereas application of the F(50,50) curves would indicate a continuously increasing field strength as the distance from the station decreases.

30. The other factor that becomes significant as the FM site approaches the TV Channel 6 site is the correlation between the field strengths of the two signals. This factor leads us to a discussion of the situation that exists when the noncommercial, educational FM station and the TV station are co-located. When this occurs, locations that receive a Channel 6 field strength that is 10 dB less than the predicted F(50,50) value are also likely to receive an FM field strength approximately 10 dB less than the predicted F(50,50) value. Because of the small amount of predicted effective interference we propose to allow, most of the actual cases of interference resulting from the operation of noncommercial, educational FM stations in areas close to TV Channel 6 stations will be within a mile or so of the FM stations. Therefore, the field strength correlations are expected to be a factor primarily where the two stations are less than one mile apart. Accordingly, we believe the noncommercial, educational FM station and a TV Channel 6 station should be regarded as co-located if the distance between the respective site coordinates is less than or equal to one mile. Because of the transmitting antenna vertical radiation pattern, we propose to require that when the noncommercial, educational FM station is more than one mile from the TV Channel 6 station and the F(50,50) Channel 6 predicted field strength is greater than 90 dBu, the field strength should be assumed to be 90.0 dBu.

31. In the Notice of Proposed Rule Making in this proceeding, the Commission proposed the co-location rules suggested by CPB. ^{13/} Those rules would provide for maximum power of a co-located noncommercial, educational FM station as a function of the FM channel, pursuant to the following table:

TABLE E

EDUCATIONAL FM CHANNEL	EFFECTIVE RADIATED POWER (dBk)
201	0.5
202	3.7
203	4.9
204	7.0
205	9.2
206	11.4
207	13.5
208	15.7
209	17.9
210-220	20.0

32. We proposed to require that the noncommercial, educational FM station applicant demonstrate that its antenna and the antenna of the TV Channel 6 station "have essentially similar horizontal and vertical radiation patterns." ^{14/} While we expect noncommercial, educational FM station applicants to coordinate such operation with the TV Channel 6 licensee and to use antennas with similar patterns, we now do not believe that this should be made a requirement set forth in a rule. We point out that considering TV receiver selectivity at -65 dBm (Table A) and assuming the additional filter rejection discussed in Paragraph 11, the proposed values are conservative. ^{15/}

33. In view of the foregoing, we propose to adopt the CPB values as the maximum ERP that a co-located noncommercial, educational FM station may use. We have presented a table (rather than the graph submitted by CPB) so that there will be no variance in interpretation. We do not propose to require that the vertical or horizontal radiation patterns of the TV and FM station antennas be similar in view of the protection being afforded. Further, we do not propose to adopt the rule proposed by CPB which would require a demonstration that coupling between the FM and TV station antennas (or transmitters) will not result in the radiation of cross-modulation

^{13/} See Op. Cit. at Footnote 1, supra, (Notice) Appendix A, proposed §73.600, from which this table is derived.

^{14/} Ibid., Appendix A, Page 18, proposed §73.507(a)(1).

^{15/} We note that EIA presented an analysis in its comments which indicated that perceptible interference could result from the CPB co-location proposal. This interference is projected to occur only when the -45 dBm ratios are used. No interference is anticipated when the -65 dBm ratios are used, and the EIA analysis gave no consideration to the use of filters to reduce or eliminate interference that may occur.

components. We believe that the current requirement in §73.316(e) is sufficiently responsive to this possibility.

34. One flexibility present in the computer program developed by the Commission that will permit its future refinement is the ability to consider the number of persons receiving interference from an educational FM station when used with population density information. In other words, interference could be limited to a specific number of persons instead of a land area. This would permit educational FM stations to operate with facilities in excess of those indicated in the Appendix when interference occurs over uninhabited or sparsely populated land areas. To incorporate this level of flexibility, however, would require an investment of staff resources that the Commission does not now possess. Consequently, we propose to adopt rules that limit the interference in terms of land area and not in terms of the actual population receiving interference. The proposed rules contain a provision permitting educational FM stations to operate with greater facilities when the Channel 6 licensee agrees to permit such operation. Factors which should be considered include the population density in the vicinity of the FM site, the presence of a TV translator station, high cable TV penetration, or terrain barriers to service or interference. We stress that we do not have the staff to give individual consideration to educational FM applicants who fail to coordinate their request for greater facilities with the Channel 6 licensee. Consequently, the proposed rules require coordination and approval from the Channel 6 licensee as a condition for acceptance of those applications requesting greater than permitted facilities.

35. One reason for our reluctance to consider individual requests in the processing of applications and our preference that applicants would refrain from filing a large number of waiver requests, is our desire to devote our available staff resources to the refinement of the computer program already developed, should it be implemented. This program now lacks the ability to consider several factors which have an impact on the facilities permitted educational FM stations. These include alternate sources of the programming being interfered with, the use of vertical polarization by noncommercial, educational FM stations and the impact cable TV has on the number of persons receiving interference. We propose to investigate the incorporation of some or all of the above factors into the program as our resources allow and we specifically invite comments on the advantages and problems associated with the use of vertical-only polarization at noncommercial, educational FM stations. Meanwhile, adoption of the proposed standards will permit the routine processing of noncommercial, educational FM applications using clearly defined guidelines. At a minimum, these standards would return a sense of certainty to the application processing procedure.

36. The rules being proposed herein are based upon a level of TV receiver performance which is, in the Commission's view, less than desirable. We know from experience that it is possible to build receivers with improved rejection ratios. The prototype receiver constructed under contract for the Commission by Texas Instruments displays superior rejection capability. We would like to see the same level of performance available in consumer models. Receiver manufacturers have been largely unresponsive to the presence of the educational FM-Channel 6 interference problem over the 16 years in which the Commission has made known its concern. Continuation of this stance will only serve to increase demand for Commission regulation of receiver char-

acteristics and, in the interim, handicap the effective and efficient use of educational FM spectrum allocation. 16/

37. Under the rule amendments proposed in the Appendix, existing educational FM stations (i.e., those for which a license or construction permit has been issued) would be grandfathered as long as any changes made in their facilities would not cause Channel 6 interference in a new area. Otherwise, the new Channel 6 TV protection standards would be applied. However, we would point out that in some cases, application of the new standards might require such a substantial reduction in the desired FM station service area that the licensee may decide to terminate operation entirely. Accordingly, we ask for comment on an alternative which would allow such broadcasters to alter their service areas in a way that would eliminate the interference to an equal sized area while allowing predicted interference to new Channel 6 service areas. Thus, no increase in interference would be permitted, but the area over which the interference takes place could change. In connection with such a change, the FM licensee could be required to provide filters or take other remedial measures to minimize the severity of interference caused to the newly affected population. However, some limit on the financial liability of the FM licensee in the resolution of such interference may be appropriate. We ask that these issues be given careful consideration and that the comments be as comprehensive as possible.

Assignment Table versus "Demand System"

38. Presently, noncommercial, educational FM assignments are made on what is called a "demand basis." The applicant may propose to locate a station virtually anywhere, provided the location, in conjunction with the proposed facilities, satisfies the technical standards designed to prevent objectionable interference between FM stations. The geographical spacings between stations needed to meet the interference standards vary according to the frequency, ERP and antenna height of nearby FM stations. Thus, if the location of a station would result in its compatibility with the existing radio environment, it would be technically acceptable to the Commission.

39. The principal advantage of the demand system is the flexibility it provides licensees in meeting local needs. It provides for the installation of technical facilities which will achieve the service area desired by the applicant after taking into consideration circumstances imposed by the existing radio environment. In areas where the spectrum is crowded, the demand system provides the best means of squeezing additional stations into a community. It results in the use of the spectrum without the burden of a formal allocation proceeding which would be needed to amend any assignment table set forth in the Commission's rules. Since stations are assigned simply on a first-come, first-served basis, the demand system has also eliminated any requirement to consider and select among competing assignment plans developed by national, state or local planning groups.

16/ Legislation has been introduced in the U.S. Senate to give the Commission authority to regulate the interference susceptibility of receivers. See S.929 [97th Congress, 1st Session]. The Commission is on record as supporting this and similar legislation which would result in some control over receiver design.

40. While it provides easy access to the spectrum, the principal problem with the demand system is that assignment efficiency may be sacrificed since there is presently no evaluation of the preclusionary impact of each new assignment. Many of those filing comments earlier in this proceeding believe that the demand system has resulted in haphazard growth in the number of stations and inefficient station placement. ^{17/} Since existing stations are protected only in terms of their actual facilities, new stations (and upgrading of poorly situated existing stations) can preclude well placed existing stations from upgrading their facilities to provide for an expanded service area, thereby inhibiting the development of the most efficient noncommercial, educational FM network. ^{18/}

41. The development and use of an assignment table for noncommercial, educational FM stations was seen by a number of those filing comments earlier in this proceeding as a remedy to these difficulties. First, it was argued that the use of a table would enable the application of a number of assignment principles and policy guidelines to what is presently seen as a haphazard process under the demand system. Such a table could express, in a simple way, the complexities of interstation mileage separation criteria, protection of Channel 6 TV reception, and other relevant technical considerations.

42. Second, it was suggested that an assignment table could help to assure an equitable allocation of FM spectrum space among the nation's communities. Experience with commercial FM broadcasting prior to the establishment of an assignment table had shown that FM channels available near larger metropolitan areas were often quickly exhausted. Nearby smaller communities that did not have an immediate demand for local FM service later found themselves precluded from obtaining an assignment due to the large number of assignments in the larger cities. The assignment table sought to avoid this situation by allotting the FM spectrum in a planned fashion. Channels were reserved for future use in areas lacking a current demand but where future growth was probable.

^{17/} Ideally, co-channel stations with comparable facilities should be located in a triangular lattice pattern for optimized system coverage. While such an arrangement is impractical in the real world, efficiency may be optimized by careful selection of transmitting sites.

^{18/} See the Notice of Inquiry, Notice of Proposed Rule Making, and Memorandum Opinion and Order, Docket 14185 (FCC 61-833), published in the Federal Register (26 F.R. 6130) on July 8, 1961, where it is demonstrated (in paragraphs 39-42) that the efficiency of a station is directly related to its service area and the distance to the nearest co-channel station. Since efficiency is proportional to the square of the service radius divided by the square of the spacing, and since spacing increases more slowly than the service radius, efficiency becomes optimum as the service area increases. In other words, a few stations with large power and antenna heights are more efficient (according to this definition) than a larger number of stations with less powerful facilities. Thus, improvement in individual station service area is an important step in the optimization of any network of radio stations.

43. General opposition to the use of an assignment table is based largely on the assertion that such a table would almost certainly fail to properly anticipate local needs, and that it would be impossible for any single entity to develop a table which would be generally acceptable. This situation is likely to result from a lack of consensus about the policy priorities which should direct the assignment of channels. Additionally, amendment of a table to accommodate changed needs or circumstances is seen by many of those filing comments as a relatively expensive and time consuming process that would be particularly burdensome to many applicants for noncommercial, educational FM stations.

44. In its comments of January 3, 1977, the Corporation for Public Broadcasting (CPB) advanced a number of new proposals which it believed would encourage more efficient and effective assignment of the spectrum remaining in the reserved portion of the FM band. 19/ The most significant of these suggestions was the development of a tentative nationwide noncommercial, educational FM assignment table which was set forth for comment by the Commission in the Further Notice. CPB indicated that while any community with a need for an educational FM station should be allowed to have one, it was impossible to try to anticipate demand in every community in the nation. Thus, the table was to be considered incomplete and freely amendable in order to accommodate future needs. In submitting the table, CPB emphasized that it was in no way to be considered the "final word" and that substantial reform was anticipated.

45. Initial reaction to the CPB table was mainly critical of the assignment criteria. 20/ That it is difficult for any single entity to anticipate local needs was evidenced by comments from representatives of several predominantly rural states that the table appeared oriented toward the more highly populated areas rather than inhabited areas, and that it conflicted with a number of state plans for noncommercial, educational FM radio. Many

19/ CPB requested adoption of a nationwide table of assignments and nine discrete classes of stations in the noncommercial, educational FM band, "alternate channel co-location" (where stations with a ± 2 or 3 channel relationship would be permitted to co-locate) and establishment of minimum, as well as maximum, ERP levels for noncommercial, educational FM stations co-located with Channel 6 TV stations. Four other proposals pertaining to the use of Channel 200 and continued Class D station operation were also made. However, inasmuch as these issues were rendered moot by the Second Report and Order in this proceeding (43 F.R. 39704, September 6, 1978), there is no need to further consider them.

20/ The assignment criteria forming the basis of the table were essentially as follows: 1.) Service in the first 248 communities in the 1970 Bureau of Census list of "Urbanized Areas;" 2.) Service to every community where there was an existing noncommercial TV reservation; 3.) The number of stations per community would be 5 where the population was more than 1,000,000, 4 if between 250,000 and 1,000,000, 3 if between 50,000 and 250,000 and 1 if 50,000 or less; 4.) No assignments would be made within 60 miles of a Channel 6 TV station (unless the FM and TV station were co-located) on FM Channels 201-209. No restrictions on location would apply to operation on FM Channels 210 or higher.

states and state-approved commissions recommended the use of substantially different assignment criteria. The fact that CPB based many of its proposed assignments on noncommercial TV reservations was also attacked. The Inter-collegiate Broadcasting System (IBS) pointed out in its comments that after 25 years, 308 out of 425 (72%) of the educational TV assignments remain unused. TV Channel 6 interests argued that the protection to be afforded their operations was inadequate, although they favored the use of an assignment table as a means of expressing any more appropriate standards that might be developed by the Commission. Others criticized the fact that the table appeared to be compiled on the premise that many existing Class D stations would not upgrade to Class A or larger facilities. Thus, many stations at educational institutions were omitted. 21/

46. Since there were in excess of 1,000 noncommercial, educational FM stations already, other more general comments argued that an assignment table could do little more than reflect the status quo. The sentiment was expressed that the additional number of assignments possible in urbanized areas was few, while the number in rural areas was so great that the use of the demand system would be more appropriate and offer greater flexibility. National Public Radio (NPR) suggested the use of a six-class station assignment system, the use of a more limited table and the need for a freeze on all noncommercial, educational FM station grants in order that any table submitted could be properly analyzed in a static environment.

47. In response to these criticisms, CPB, in its comments of January 15, 1980, submitted a revised and expanded table based upon a new set of assignment criteria. 22/ CPB noted that the "Mexican Table" (see §73.504) had apparently proven workable, with amendments made as necessary, and indicated

21/ In fact, since the table was first submitted by CPB, approximately 80% of the existing Class D stations have applied for increased facilities. This has had the effect of precluding many of the assignments proposed by CPB.

22/ There were three assignment criteria of a general nature and five of a specific nature:

- General:
- 1.) First public radio service to every citizen of the U.S.
 - 2.) Increased access to public radio media by minorities and women.
 - 3.) Increased capability for educational institutions to use noncommercial radio.
- Specific:
- 1.) Attempt to allocate new channels in unserved markets with a population of 200,000 or more.
 - 2.) Upgrade facilities of existing stations where it would add significantly to the population receiving first FM service.
 - 3.) Allocate channels at sites with nearby colleges, universities and other appropriate support institutions.
 - 4.) Allocate channels to rural communities of 10,000 or more.
 - 5.) Attempt to allocate new channels to upgrade existing services everywhere in order to establish the potential for second and third services.

that it had considered input from many state associations and other interested parties concerning specific needs and priorities for new stations. 23/

48. Having reviewed the comments, the Commission found itself substantially in accord with the opinions expressed in Paragraph 46, supra. Nonetheless, recognizing that a limited table might have some value, we decided to investigate the feasibility of it. A computer evaluation of the CPB table was conducted in March of last year. Finding no persuasive reason why the class structure of commercial and noncommercial stations should be different, we equated the stations in the CPB table with the classes of stations proposed for commercial use in BC Docket No. 80-90. 24/ In that proceeding, five classes of stations were proposed with the following maximum facilities:

Class of station	ERP (kw)	HAAT (feet/meters)
A	3	300/91.5
B1	20	300/91.5
B	50	500/152.4
C1	100	1000/304.8
C	100	2000/609.6

It was felt that stations with the equivalent of Class A facilities or less should be excluded from the limited table and continue to be made available on a demand basis. (Of course, Class A station assignments could not be made if they conflicted with reservations in the limited table.) CPB's recommended B2, B1, C2 and C1 classes were changed to our proposed B1 and C1 classes. This reduced the number of entries in the CPB table to 182.

49. These entries were computer evaluated for co-channel and first, second and third adjacent channel compatibility with the existing FM environment and proximity to Channel 6 stations. The computer evaluation indicated that at that time, 61 proposals (34%) were capable of adoption and 121 were not. Thirty-one stations (17%) were rejected solely due to proximity to Channel 6 TV stations. 25/ Forty-nine (27%) were precluded by existing facilities for which a license or construction permit was outstanding (including instances where the proposed assignment was precluded because of

23/ However, several of those filing comments pointed to the need to continually amend the "Mexican Table" as a good example of the difficulty in predicting the need for noncommercial, educational FM service and argued that such amendments constituted a needless burden that would be imposed by the use of a more extensive assignment table.

24/ See the Notice of Proposed Rule Making, BC Docket No. 80-90 (FCC 80-108), released March 14, 1980, and published in the Federal Register (45 F.R. 17602) on March 19, 1980.

25/ At the time of this study, the Channel 6 protection model previously discussed had not been developed. The simplistic approach was taken of rejecting the FM stations if they were located near or within the Grade B contour of a nearby Channel 6 TV station.

adjacent channel interference considerations). The remaining 41 stations (22%) were rejected solely because of conflict with applications already on file (it was presumed that all of the applications would be granted).

50. The study was repeated in August of last year. It was found that 56 (31%) proposals were capable of adoption. There was no change in the number of FM stations precluded by Channel 6 TV stations. Fifty-nine (32%) were precluded by existing facilities for which a license or construction permit was outstanding and thirty-five (19%) conflicted with applications already on file.

51. From the above, it can be seen that over the relatively short period of 5 months, 4 proposed allotments were precluded by FM actions. Further, application of the Channel 6 protection model proposed herein would probably reduce the number of table allotments by 15 to 20. However, this loss could probably be offset by reducing the class of station at 15 to 20 of the proposals rejected. Lastly, of the 90 to 94 proposals precluded by FM applications, construction permits and licenses, only about 25 are eliminated primarily due to a station or application in the same city (or within 10 miles) with facilities greater than Class A. This means that many of the assignments that have been made would have to have gone through some kind of table amendment process had the table been placed in the rules at an earlier date. For these reasons, and because a substantial number of the remaining assignments in the limited table are in relatively unpopulated areas of the country where the desired assignments would be readily available under the demand system, the Commission believes that there would be little, if any, advantage to adopting an assignment table for noncommercial, educational FM stations at this time. Nevertheless, we seek additional comment on the desirability of the CPB table at this time, and on the limited version of it as discussed above.

52. We also seek comment on two other issues loosely related to the CPB table question. ✓

53. Currently, we have no maximum power and antenna height restrictions in the noncommercial, educational FM band. However, a note in the rules warns applicants for more than the commercial maximums that their requests "will not necessarily be granted." We herein propose to adopt the commercial FM maximum power and antenna height limits for noncommercial, educational FM stations, since as explained above, there appears to be no compelling reason why they should be different.

54. We also propose to amend the rules governing the determination of objectionable interference among noncommercial, educational FM stations so that they will parallel the prohibited overlap rules in §73.37 for AM broadcast stations. Generally speaking, this will not mean that an application that is now acceptable under the present rules will be unacceptable, or vice-versa. However, the shift from interference ratios to prohibited overlap will eliminate the anomaly involving second and third adjacent channel stations which move closer to each other. Currently, if second and third adjacent channel stations which already violate the objectionable interference prohibition in §73.509 move closer to each other, it appears as though the interference area is decreased. Indeed, if the two antennas are co-located, it appears that there would be no interference when §73.509 is applied. In

fact, the desired-to-undesired interference ratios in §73.509 are not valid at the high signal strengths that occur when the two antennas approach each other. By changing the focus from objectionable interference to prohibited overlap, this anomaly will be eliminated. We previously followed this approach in AM when we amended the AM rules in the same manner to eliminate the same anomaly. See the Report of the Commission in Docket No. 8089 and the associated Order, 12 F.R. 3893 (June 14, 1947).

55. Regulatory Flexibility Act Initial Analysis

I. Reason for action

Growth in noncommercial, educational FM and public radio over the past decade has exacerbated interference to the reception of TV Channel 6 transmissions. A resolution to this problem is necessary to alleviate the interference and to enable applicants for noncommercial, educational FM stations to reasonably plan the facilities of new desired stations.

The remaining outstanding issue in this proceeding, the need for an assignment table for noncommercial, educational FM stations is being raised again at this time because it is believed to be unnecessary in view of the state of development of nationwide noncommercial, educational FM radio.

II. The objectives

The Commission, in the proposed rules herein set forth for public comment, desires to strike a reasonable balance between affording protection to the reception of TV Channel 6 transmissions and providing for reasonable non-commercial, educational FM station facilities.

Final resolution of this issue and the question of an assignment table for noncommercial, educational FM stations will permit the proceeding to be terminated.

III. Legal basis

Action proposed is in furtherance of Sections 303(r) and 4(1) of the Communications Act of 1934, as amended, which permits the Commission to make such rules and regulations, not inconsistent with law, as may be necessary in the execution of its functions, with the additional view of the public welfare.

IV. Description, potential impact and number of small entities affected

On the matter of Channel 6 TV protection standards, no impact on existing broadcast licensees and construction permit holders is anticipated. Approximately 40% of the applicants for new or substantially modified facilities would be affected by the new rules, which would require a reduction in effective radiated power or antenna height for noncommercial, educational FM stations located near Channel 6 TV stations. The proposed rules would, in effect, limit the service areas of such new stations and as a result, would limit the potential audience. This is likely to have an additional adverse impact in terms of the financial support available for the affected FM stations in areas served by Channel 6 TV stations. Further, at least in the

larger metropolitan areas, it is generally not possible to authorize additional high-powered noncommercial stations due to existing co-channel and adjacent channel protection criteria. Adoption of the proposed rules would further reduce the probability of such a grant where it is now possible if the station is within or near the service contour of a TV Channel 6 station. In the future, most noncommercial, educational FM stations authorized in these areas would probably be small or medium sized operations. In sum, adoption of the proposed rules will generally limit the size of new noncommercial, educational FM stations and make upgrading of many existing stations unlikely when these stations are located in areas served by Channel 6 TV stations.

On the other issue, the need for an assignment table for noncommercial, educational FM stations, the Commission believes that the net impact will be neutral. Existing stations presently unable to upgrade to larger facilities are likely to be similarly restricted in the future. Existing stations capable of upgrading would retain this option if restrictive assignments were not included in the table.

V. Recording, record-keeping and other compliance requirements

None. However, if an assignment table for noncommercial, educational FM stations is adopted, amendment of such a table under existing regulations would be a time-consuming, burdensome and expensive process for smaller applicants and licensees.

VI. Federal rules which overlap, duplicate or conflict with these rules

Adoption of the proposed Channel 6 TV protection rules will inhibit achievement of the goals set out in §390 of the Communications Act of 1934, as amended, which would: (1) extend delivery of public telecommunications services to as many citizens of the United States as possible by the most efficient and economical means (this objective has traditionally been sought by the installation of a smaller number of high-powered stations with large service areas); (2) increase public telecommunications services and facilities available to, operated by, and owned by minorities and women (the potential number and size of such stations would be reduced by adoption of the proposed rules); and (3) strengthen the capability of existing public television and radio stations to provide public telecommunications services to the public (adoption of the proposed rules would reduce the number of existing FM station upgrades possible and by reducing the potential facilities of new FM stations, would limit diversity of service.)

VII. Any significant alternatives minimizing the impact on small entities and consistent with the stated objective

No other significant alternatives appear available. Maintaining the status quo would result in additional interference to TV Channel 6 reception. Were the Federal Communications Commission to have statutory authority to regulate the design of television receivers, the impact on noncommercial, educational FM broadcasters could be softened by mandating state-of-the-art receiver improvements which would spread the burden for resolving the interference situation over a larger part of the telecommunications industry.

The Secretary shall cause a copy of this Second Further Notice of Proposed Rule Making, including the Initial Regulatory Flexibility Analysis, to be sent to the Chief Counsel for Advocacy of the Small Business Administration in accordance with §603(a) of the Regulatory Flexibility Act (Pub. L. No. 96-354, 94 Stat. 1164, 50 U.S.C. et seq.).

56. Accordingly, IT IS PROPOSED to amend Part 73 of the Commission's Rules as set forth in the attached Appendix.

57. Authority for the action taken herein is contained in §§4(i) and 303(r) of the Communications Act of 1934, as amended.

58. Pursuant to the procedures set forth in §§1.4, 1.415 and 1.419 of the Commission's Rules and Regulations, interested parties may file comments on or before August 24, 1982, and reply comments on or before October 8, 1982. All submissions by parties to this proceeding or by persons acting on behalf of such parties must be made in written comments, reply comments or other appropriate pleadings.

59. In accordance with §1.419 of the Commission's Rules and Regulations, an original and five copies of all comments, reply comments, pleadings, briefs or other documents shall be furnished the Commission. Members of the general public who wish to participate informally in this proceeding may submit one copy of their comments, specifying Docket No. 20735.

60. All filings in this proceeding will be available for examination by interested parties during regular business hours in the Commission's Public Reference Room at its headquarters at 1919 M St., N.W., Washington, D.C.

61. For further information in this proceeding, contact Gordon Godfrey, Broadcast Bureau, (202) 632-9660. For purposes of this nonrestricted notice and comment rule making proceeding, members of the public are advised that ex parte contacts are permitted from the time the Commission adopts a notice of proposed rule making until the time a public notice is issued stating that a substantive disposition of the matter is to be considered at a forthcoming meeting or until a final order disposing of the matter is adopted by the Commission, whichever is earlier. In general, an ex parte presentation is any written or oral communication (other than formal written comments or pleadings and formal oral arguments) between a person outside the Commission and a Commissioner or a member of the Commission's staff which addresses the merits of the proceeding. Any person who submits an ex parte presentation must serve a copy of that presentation on the Commission's Secretary for inclusion in the public file. Any person who makes an oral ex parte presentation addressing matters not fully covered in any previously filed written comments on the proceeding must prepare a written summary of that presentation; and, on the day of oral presentation, that written summary must be served on the Commission's secretary for inclusion in the public file, with a copy to the Commission official receiving the oral presentation. Each ex parte presentation described above must state on its face that the Secretary has been served, and must also state by docket number the proceeding to which it relates. All relevant and timely comments will be considered by the Commission before final action is taken in this proceeding. In reaching its decision, the Commission may take into consideration information and ideas not

contained in the comments, providing that such information or a statement indicating the nature and source of such information is placed in the public file, and provided that the fact of the Commission's reliance on such information is noted in the Report and Order. A summary of the Commission's procedures governing ex parte contacts in informal rule makings is available from the Commission's Consumer Assistance Office, FCC, Washington, D.C. 20554 (202) 632-7000.

FEDERAL COMMUNICATIONS COMMISSION

William J. Tricarico
Secretary

Attachment: Appendix

A P P E N D I X

It is proposed to amend 47 C.F.R. Part 74 of the Commission's Rules and Regulations as follows:

1. It is proposed to revise Section 73.509 as follows:

§73.509 Prohibited overlap.

(a) An application for a new station or an application for a change in a station which would result in a non-Class D (secondary) station will not be accepted if the proposed operation would involve overlap of signal strength contours with any other station more than 320 kilometers (199 miles) from the U.S.-Mexican border and operating in the reserved band (Channels 200-220, inclusive) as set forth below:

Frequency Separation	Contour of Proposed Station	Contour of Any Other non-Class D (Secondary) Station
Co-channel	0.1 mV/m (40 dBu) 1 mV/m (60 dBu)	1 mV/m (60 dBu) 0.1 mV/m (40 dBu)
200 kHz	0.5 mV/m (54 dBu) 1 mV/m (60 dBu)	1 mV/m (60 dBu) 0.5 mV/m (54 dBu)
400 kHz	10 mV/m (80 dBu) 1 mV/m (60 dBu)	1 mV/m (60 dBu) 10 mV/m (80 dBu)
600 kHz	100 mV/m (100 dBu) 1 mV/m (60 dBu)	1 mV/m (60 dBu) 100 mV/m (100 dBu)

(b) An application by a Class D (secondary) station, other than an application to change class, will not be accepted if the proposed operation would involve overlap of signal strength contours with any other station as set forth below:

Frequency Separation	Contour of Proposed Station	Contour of Any other Station
Co-channel	0.1 mV/m (40 dBu)	1 mV/m (60 dBu)
200 kHz	0.5 mV/m (54 dBu)	1 mV/m (60 dBu)
400 kHz	10 mV/m (80 dBu)	1 mV/m (60 dBu)
600 kHz	100 mV/m (100 dBu)	1 mV/m (60 dBu)

(c) The following standards shall be used to compute the distances to the pertinent contours:

(1) The distance to the 60 dBu (1 mV/m) contours shall be computed using Figure 1 of §73.333 [F(50,50) curves] of this Chapter.

(2) The distance to the other contours shall be computed using Figure 1a of §73.333 [F(50,10) curves] of this Chapter. In the event that the distance to the contour is below 16 kilometers (10 miles), and therefore not covered by Figure 1a, the curves in Figure 1 shall be used.

(d) An application for a change (other than a change in channel) in the facilities of a noncommercial, educational FM broadcast station covered by this Section will be accepted even though overlap of signal strength contours as mentioned in this Section would occur with another station in an area where such overlap does not already exist, if:

(1) The total area of overlap with that station would not be increased;

(2) There would be no net increase in the area of overlap with any other station;

(3) The area of overlap does not move significantly closer to the station receiving the overlap; and,

(4) There would be created no area of overlap with any station with which the overlap does not now exist.

(e) The provisions of this Section concerning prohibited overlap will not apply where the area of such overlap lies entirely over water.

(f) No application for FM Channel 200 will be accepted if the requested facility would cause interference to Channel 6 operations, including TV translators on this channel. Such objectionable interference will be considered to exist whenever the 15 dBu contour based on the F(50,10) curves on §73.333 Figure 1a of the proposal would overlap the 40 dBu contour based on the F(50,50) curves in §73.699 Figure 9, of the television station.

2. In Section 73.512, Paragraph (c) would be revised as follows:

§73.512 Special procedures applicable to Class D noncommercial, educational FM stations.

* * * * *

(c) New Class D station applications are acceptable for filing in areas where the provisions of §73.525 would preclude the assignment of at least Class A minimum facilities. An application for a Class D station to operate in the State of Alaska is also acceptable provided the provisions of §73.509(a) or (b) are satisfied.

* * * * *

3. A new Section 73.525 entitled "TV Channel 6 Protection" is created to read as follows:

§73.525 TV Channel 6 protection.

(a) Noncommercial, educational FM stations authorized as of 1982, may make changes in operating facilities or location that do not result in an altered service area without considering the requirements of this section.

(b) Absent concurrence from an affected TV Channel 6 licensee, no application for a facility located more than 1.6 kilometers (approximately 1 mile) but less than 225 kilometers (approximately 140 miles) from a Channel 6 TV station and which will be operated on any channel available pursuant to §73.501 of this Part will be accepted for filing unless it conforms to the power limitations set forth in paragraph (c) of this section. Stations to be located less than 1.6 kilometers (approximately 1 mile) from a TV Channel 6 station shall conform to the power limitations set forth in paragraph (d) of this section.

(c) Follow the steps below to determine the maximum effective radiated power of a noncommercial, educational FM station to be located more than 1.6 kilometers (approximately 1 mile) but less than 225 kilometers (approximately 140 miles) from a TV Channel 6 station:

(1) The distance to the authorized TV Channel 6 station shall be determined by use of the method set forth in §73.208(c) of this Part.

(2) The predicted TV Channel 6 field strength at the proposed FM transmitter site shall be determined by use of the distance determined in subparagraph (1), the authorized effective radiated power and the antenna height above average terrain of the TV Channel 6 station, and Figure 9 of §73.699 [F(50,50) curves] of this Part.

(3) The initial permitted FM station power, assuming an antenna height of 30 meters (100 feet) above average terrain, shall be obtained from the following table. If the TV Channel 6 field strength determined in subparagraph (2) does not correspond exactly with a field strength in the table, linear interpolation shall be used. If the TV Channel 6 field strength determined in subparagraph (2) is greater than 90 dBu, then the initial power shall be the value corresponding to a TV Channel 6 field strength of 90 dBu.

TABLE A

TV CHANNEL 6 STATION F(50,50) FIELD STRENGTH (dBu)	PERMITTED FM STATION ERP @ 30 METERS (100 feet) HAAT FOR OPERATION ON CHANNEL 211 (dBk)
90.0	18.0
80.0	7.7
75.0	3.3
70.0	0.8
65.0	-2.2
55.0	-11.8
50.0	-16.9
48.0	-18.6
47.6	-18.6

47.4	-18.4
47.2	-17.4
47.0	-15.3
46.0	-1.7
45.0	5.0
40.0	20.0
30.0	33.4
10.0	56.9

(4) If the antenna height above average terrain of the requested facility is greater than 30 meters (approximately 100 feet), the initial power determined in subparagraph (3) shall be reduced by the amount necessary to result in an equivalent predicted field strength, pursuant to the following procedures:

(i) If the TV Channel 6 field strength determined in subparagraph (2) is greater than 46.5 dBu, equivalence shall be determined at 1.6 kilometers (approximately 1.0 mile).

(ii) If the TV Channel 6 field strength determined in subparagraph (2) is less than 46.5 dBu, then the distance to the TV Channel 6 47 dBu contour shall be determined by use of the TV Channel 6 authorized effective radiated power and antenna height above average terrain, and Figure 9 of §73.699 [F(50,50) curves] of this Part. The difference between the TV Channel 6 47 dBu distance and the distance determined in subparagraph (1) is the distance at which equivalence shall be determined.

(iii) The equivalent FM station field strength shall be determined using Figure 1 of §73.333 [F(50,50) curves] of this Part.

(5) The requested FM station effective radiated power shall not exceed the value determined in subparagraph (4) plus the value from the following table that corresponds with the requested channel:

TABLE B

FM CHANNEL	FREQUENCY	POWER ADJUSTMENT
201	88.1 MHz	-32.0 dB
202	88.3	-26.2
203	88.5	-20.5
204	88.7	-14.7
205	88.9	-9.0
206	89.1	-4.5
207	89.3	0
208	89.5	0
209	89.7	0
210	89.9	0
211	90.1	0
212	90.3	+0.8
213	90.5	+1.5
214	90.7	+3.8
215	90.9	+6.0
216	91.1	+7.0

217	91.3	+8.0
218	91.5	+11.5
219	91.7	+15.0
220	91.9	+18.0

(6) In this subparagraph, the symbol "D" represents the desired Channel 6 field strength in dBu, found in subparagraph (2). The symbol "U" represents an undesired Channel 5 or Channel 6 field strength, also in dBu, calculated in accordance with subparagraphs (1) and (2), except, if the undesired station is on Channel 6, Figure 9a of § 73.699 [F(50,10) curves] of this Part is used in lieu of Figure 9.

(i) If the undesired station is on Channel 5 and the value of the following function is greater than zero, that value is added to the permitted power from subparagraph (5):

$$U - D - 6 \text{ dB.}$$

(ii) If the undesired station is on Channel 6 and the value of the following function is greater than zero, that value is added to the permitted power from subparagraph (5):

$$28 \text{ dB} + U - D.$$

(iii) If both subparagraphs (i) and (ii) result in values greater than zero, only the larger of the two values is added to the permitted power from subparagraph (5).

(d) The requested effective radiated power of a noncommercial, educational FM station to be located less than 1.6 kilometers (approximately 1.0 mile) from a TV Channel 6 station shall not exceed the following values:

TABLE C

EDUCATIONAL FM CHANNEL	EFFECTIVE RADIATED POWER (dBk)
201	0.5
202	3.7
203	4.9
204	7.0
205	9.2
206	11.4
207	13.5
208	15.7
209	17.9
210-220	20.0

